Appl. No. 10/667,041
Restriction Response. Dated 4 March 2005
Reply to Office action of 10 February 2005

Amendments to the Specification:

Please replace paragraph 13 with the following rewritten paragraph:

[0013] In accordance with another embodiment, the reverse flow combustor for a gas turbine comprises a combustor casing comprising an elongated cylindrical combustor liner interiorly defining a combustion chamber and a reverse flow fluid passageway between the liner and the casing, wherein the combustor liner comprises a plurality of openings about a primary combustion zone, and a plurality of openings radially disposed in the liner about a dilution zone of the combustion chamber; a swirler and mixer assembly upstream from the combustion chamber; and a domeplate intermediate the combustion chamber and the swirler and mixer assembly comprising a heat shield having an annular end body, wherein the domeplate further comprises a plurality of fluid openings to provide an airflow that impinges upon a ~~backside~~ an outer surface of the heat shield during operation of the gas turbine, wherein the plurality of openings radially disposed in the liner about the primary combustion zone provide a fluid flow that impinges on the ~~backside~~ outer surface of the heat shield during operation of the gas turbine.

Please replace paragraph 35 with the following rewritten paragraph:

[0035] An igniter 138 extends through combustor casing 112 and liner 122 through openings 139, 141 and is disposed downstream from the heat shield 136. The domeplate openings 220 and the combustion liner openings 142 cooperate such that ~~such that~~ during operation air flow through these openings 142, 220 directly impinge the ~~backside~~ outer surface of heat shield 136 at an angle substantially perpendicular to the heat shield 136, which is then mixed with the fluid flow downstream of the flame in the combustion chamber 124, thereby providing a secondary means for reducing the equivalence ratio.

Please replace paragraph 41 with the following rewritten paragraph:

[0041] Shroud 182 preferably includes annularly tapered walls 208, which tapers uniformly from the forefront of the shroud 182 to the domeplate 134 as shown to increase flow velocities within shroud 182. Because shroud 182 converges, a fuel/air mixture flowing within shroud 182 is accelerated, which helps to minimize boundary layers from accumulating within shroud 182 and thus, minimizes flashbacks stemming therefrom. Shroud 182 further includes a fuel plenum 210 radially disposed about the shroud. A plurality of fluid passageways 206 is formed within the shroud 182 extending from the plenum 210 to the combustion chamber 124. In this particular configuration, each swirler and mixer assembly preferably includes eight such fluid passageways. The fuel plenum 210 and fluid passageways 206 extending therefrom are in fluid communication with the secondary fuel nozzles, e.g., the combination of elements 212, 214, 216, and 218 (as described in further detail below) to define a secondary fuel system.

Please replace paragraph 42 with the following rewritten paragraph:

[0042] Figure 10 illustrates an enlarged section of a portion of the combustor assembly 102 to more

clearly show the secondary fuel delivery system as well as the openings 142, 220 in the dome plate 134 and liner 122, respectively, for air impingement on the ~~backside~~ outer surface of the heat shield 136. In addition, Figure 10 illustrates an L-shaped ferrule 216 trapped in a recess formed in domeplate 134. A ferrule retainer 218 preferably retains the ferrule 216 to permit movement thereof. The movement of the ferrule 216 between the domeplate 134 and an exterior wall defining the shroud 182 permits relative motion between these components while defining an adjustable fluid passageway 214, which is in fluid communication with fluid passageway 132. In this manner, fluid, e.g., air, flowing through fluid passageway 132 can flow into the combustion region by the passageway controlled by the movement of ferrule 216.

Please replace paragraph 45 with the following rewritten paragraph:

[0045] In operation, compressed air is directed via a reversed flow or co-flow towards the end cap 120, where the compressed air splits into combustion air via the premixers 154, 156, 158, 160, domeplate 134 and heat shield 136 impingement air via openings 146 and 142, and dilution air via openings 144. The domeplate and heat shield impingement air impinge on the ~~backside~~ outer surface of the heat shield 136 at an angle substantially perpendicular to the airflow and mix further downstream with the combustion gases. The combustion air is premixed with the premix fuel by means of the inner and outer swirler, e.g., 178, 180, respectively, and delivered to the flame front. The shroud 182 has a secondary fuel circuit that delivers the pilot fuel in a diffusion flame manner via a number of openings at the shroud tip. The two fuel delivery systems preferably operate and are controlled independently. For a fixed flame temperature, each swirler and premixer assembly can be operated independently such that the combined fuel flow corresponds to the required equivalence ratio. Thus, each swirler and mixer assembly (four as shown) can operate at different equivalent ratios to generate emissions that are compliant with regulations per combustor and achieve stability of operation and low dynamics. The remaining air (dilution air) is directed towards the openings 144 for heat transfer purposes so as to minimize NOx emissions that normally occur at higher temperatures.

Please replace paragraph 50 with the following rewritten paragraph:

[0050] A low emission turbine includes a reverse flow can-type combustor that generally includes a primary and secondary fuel delivery system that can be independently controlled to produce low CO, UHC, and NOx emissions at design set point and at conditions other than design set point. The reverse flow can-type combustor generally includes an annularly arranged array of swirler and mixer assemblies within the combustor, wherein each swirler and mixer in the array includes a primary and secondary fuel delivery system that can be independently controlled. Also disclosed herein is a can-type combustor that includes fluid passageways that perpendicularly impinge the ~~backside~~ outer surface of a heat shield. Processes for operating the can-type combustors are also disclosed.